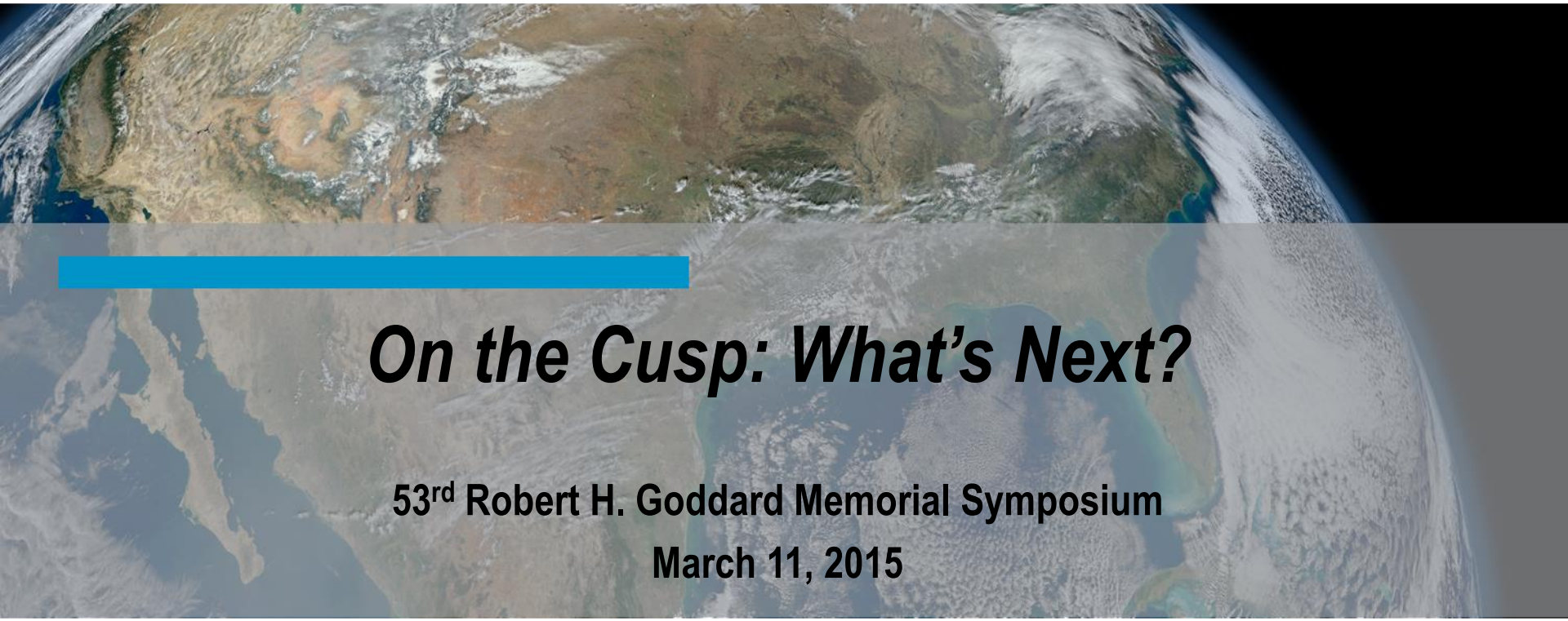


On the Cusp: What's Next?

53rd Robert H. Goddard Memorial Symposium

March 11, 2015

NOAA Satellite and Information Service

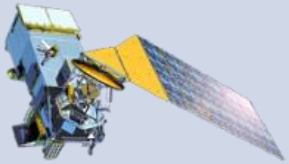
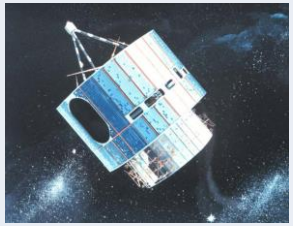
Dr. Stephen Volz, Assistant Administrator

on the cusp (of something)

Fig. 1. At the point in time that marks the beginning of something. e.g. *The transistor was on the cusp of a new age in electronics.*

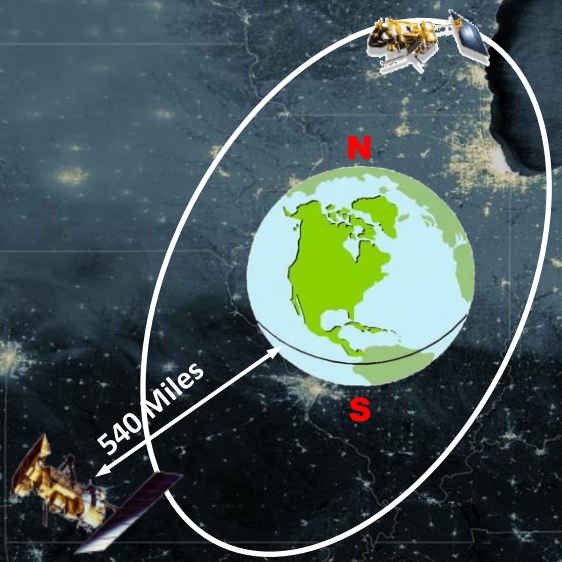
2. On the threshold or verge of a development or action.
3. At the dividing line or border of two conditions or categories.

Weather Observations Have Seen Several Transitions

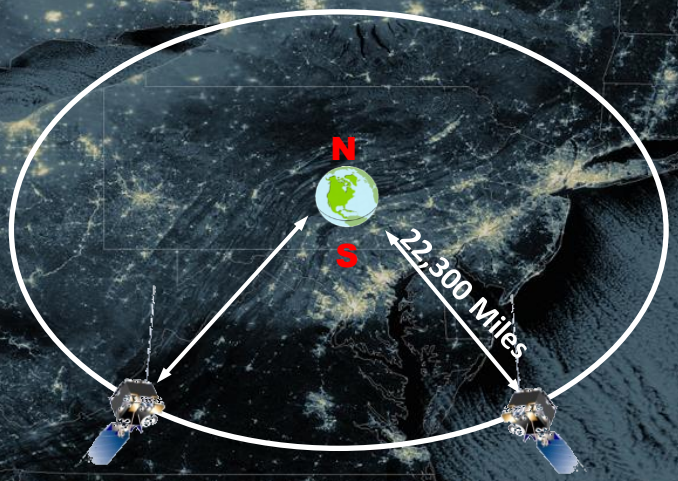
1960	1980	2000	2020	2040
Tiros-1 launch in April 1960. 48° inclination. Nimbus-1 launch in Aug. 1964. First infrared sensor. Tiros-9 launch in 1965. "Cartwheel configuration." First polar orbit.	NOAA-6 launch in June 1979. First AVHRR. NOAA-8 launch in March 1983. Physically larger and had more power than their predecessors	NOAA-15, 16, 17. Heavier and more microwave channels. NOAA-18, 19 Direct orbit insertion. JPSS next-gen development. NOAA + EUMETSAT IJPS agreement Nov. 19, 1998.	JPSS series operational. 22 channel imager. Next-gen CrIS and ATMS. 	
GOES-1 launch in 1975. 	GOES-I (GOES-8) launch in 1994. GOES-I through –M. **Three-axis stabilized**. First independently operating sounder and imager. GOES-10 launched as on-orbit spare.	GOES-N/O/P operational. Imager and Sounder with flexible scan control.  GOES-R next-gen development.	GOES-R through –U operational. Next-gen ABI. First lightning mapper from GEO.	

NOAA's Observational Paradigm Has Been: Two Orbits, One Mission

Polar-orbiting Operational Environmental Satellites (POES) Followed by S-NPP and JPSS-1 thru -4



Geostationary Operational Environmental Satellites (GOES), Through GOES-U



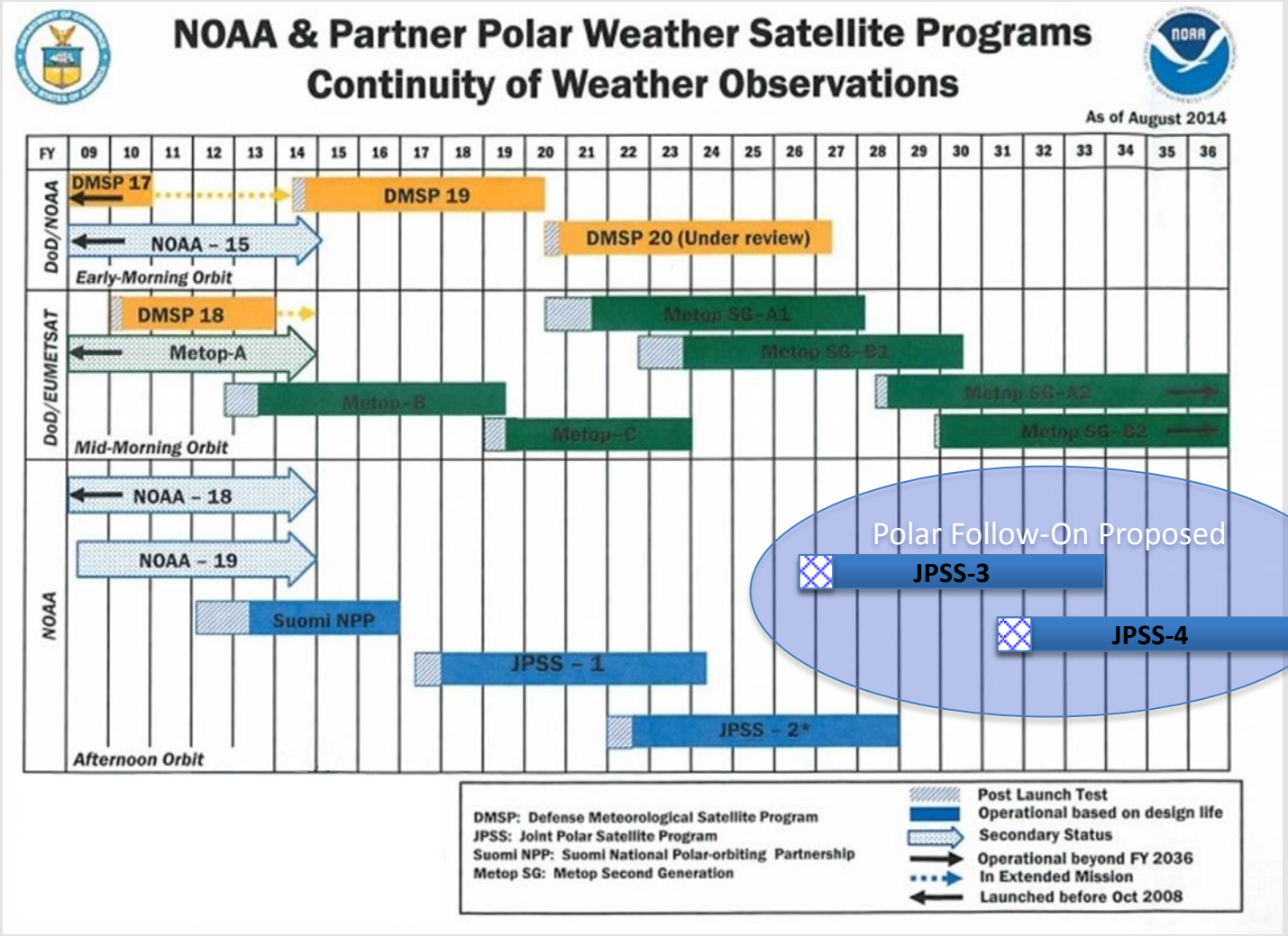
NOAA/NASA

S-NPP image of North America

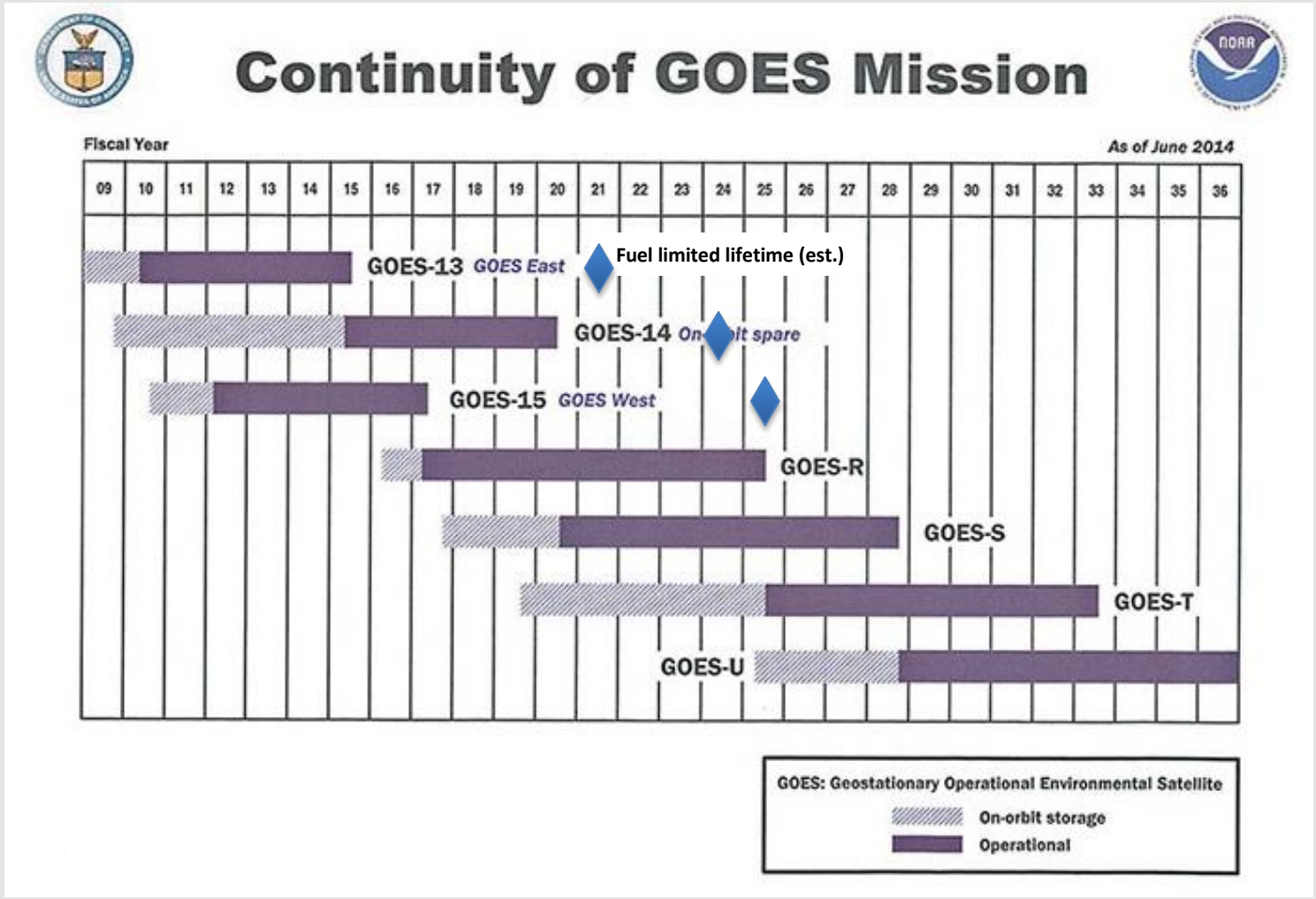
NOAA's Established LEO and GEO Platforms

- From Low Earth Orbit
  - The five (5) satellite combination of JPSS + Polar Follow-On (PFO) will establish NOAA's LEO coverage in the afternoon orbit well into the 2030s
  - Cooperative agreements with EUMETSAT and DMSP (near term) establishes the global polar constellation
- From Geostationary Orbit
  - The GOES-R through –U series, following on the GOES-N/O/P series, provides the US continental coverage well into the 2030s
  - Cooperative agreements with EUMETSAT and JMA establishes the global geostationary constellation
- Together, these platforms have and will form the backbone of our observing network for the coming decades
  - To which we will add measurements from other sources to improve our NWP performance

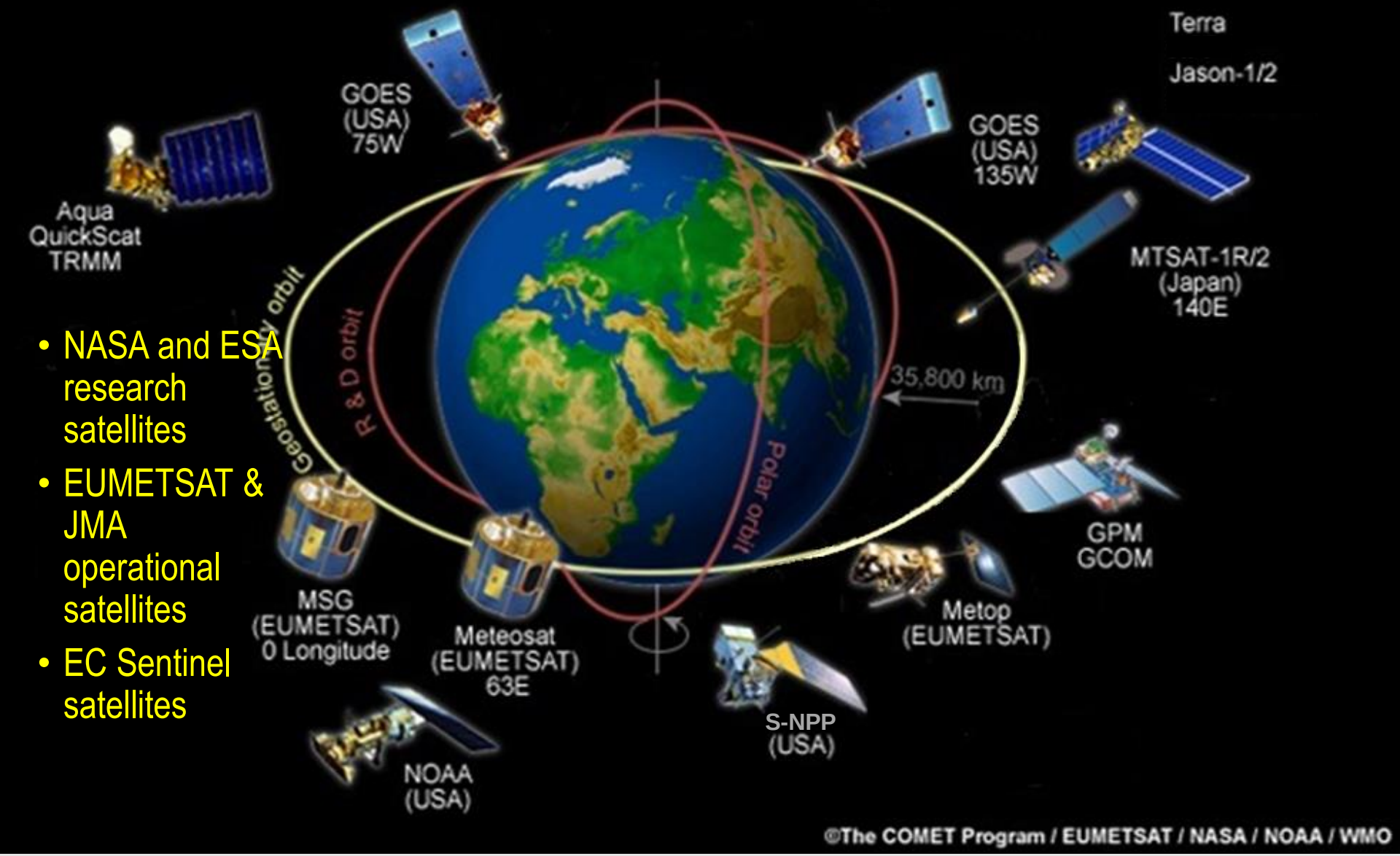
Polar Flyout Chart



GOES Flyout Chart

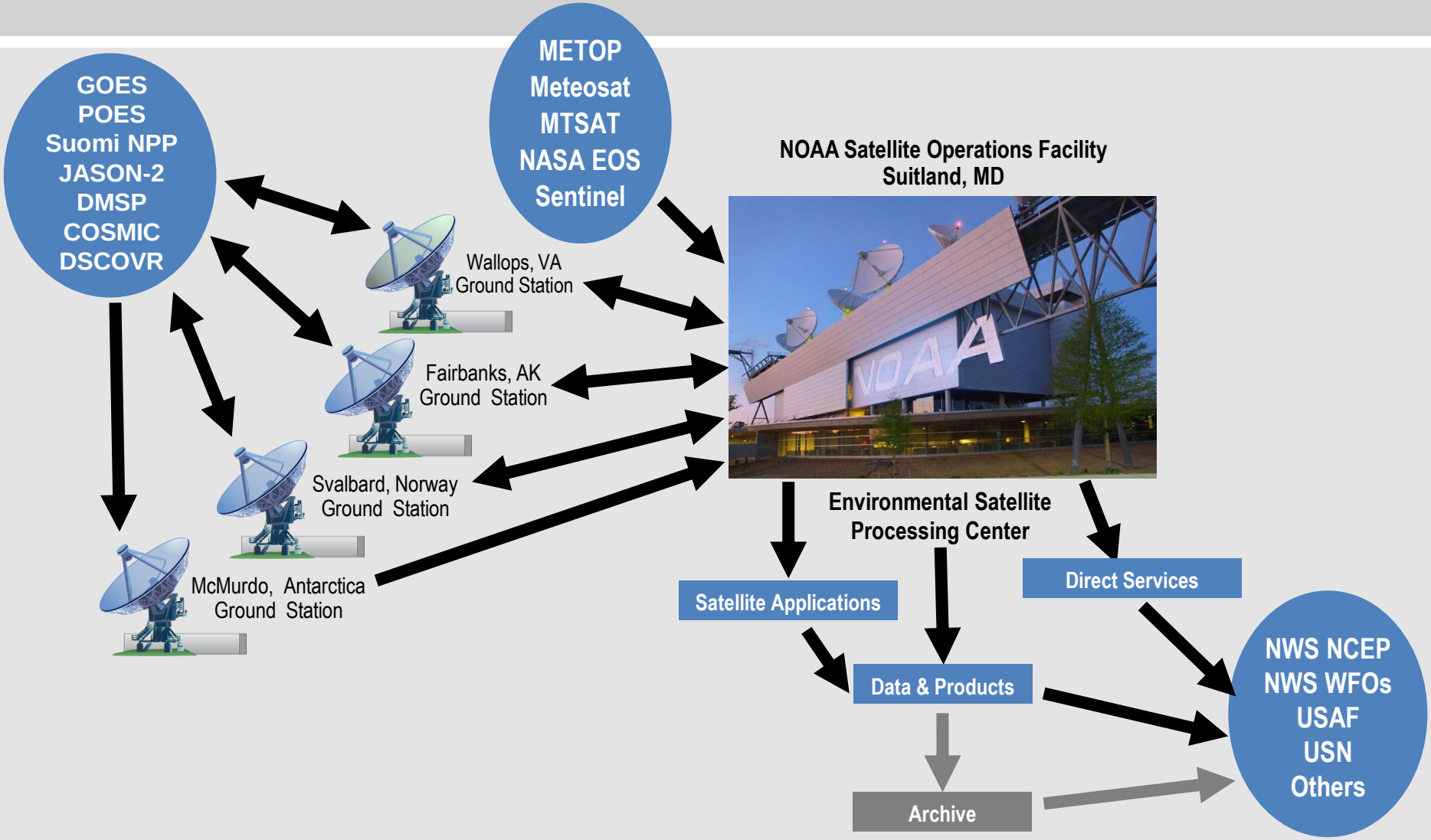


Our Weather Observations Involve Much More than NOAA



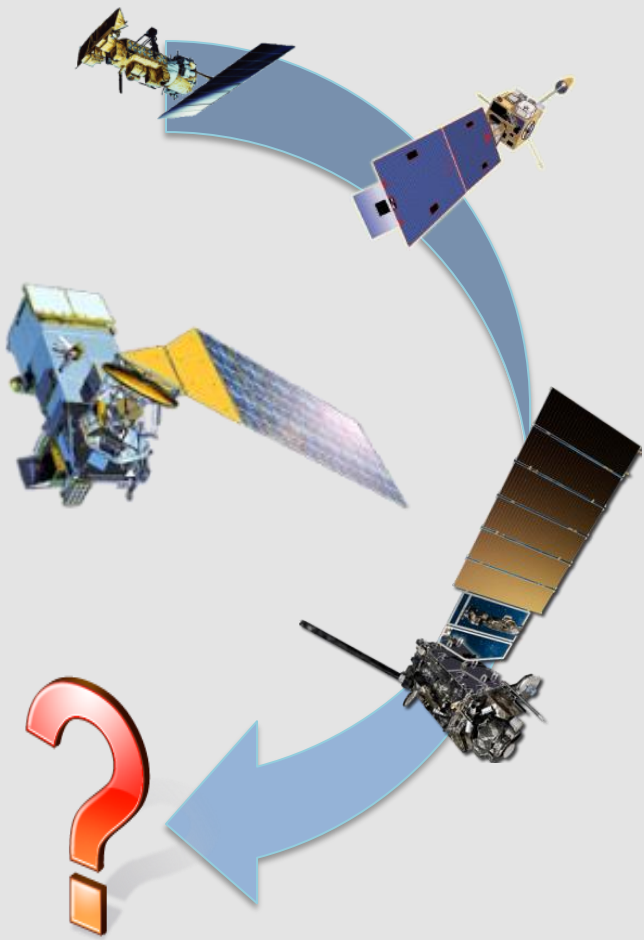
- NASA and ESA research satellites
- EUMETSAT & JMA operational satellites
- EC Sentinel satellites

Current Paradigm for NWP Data



What's Next?: Moving Beyond "Two Orbits"

- We are broadening our "polar satellite" LEO perspective
  - Still have the core POES/JPSS satellites, through ~2038, but augmented with others
  - Cosmic-2 RO mission, 1st six satellites launching in 2016, 2nd six targeted for FY2019
  - Earth Observing Nanosatellite - Microwave (EON-MW) as an alternative microwave sounding approach
  - Smallsats or hosted payloads may also contribute
- We may also broaden our GEO perspective
  - We will still have the GOES-R series, through ~2036, but may augment them with others
  - Alterative architectures, including hosted payload opportunities
  - Possibly to include alternative orbits, for arctic viewing for example
- Increasingly, commercial possibilities may emerge to supply some of NOAA's data needs



NOAA's Ongoing Commercial Discussions

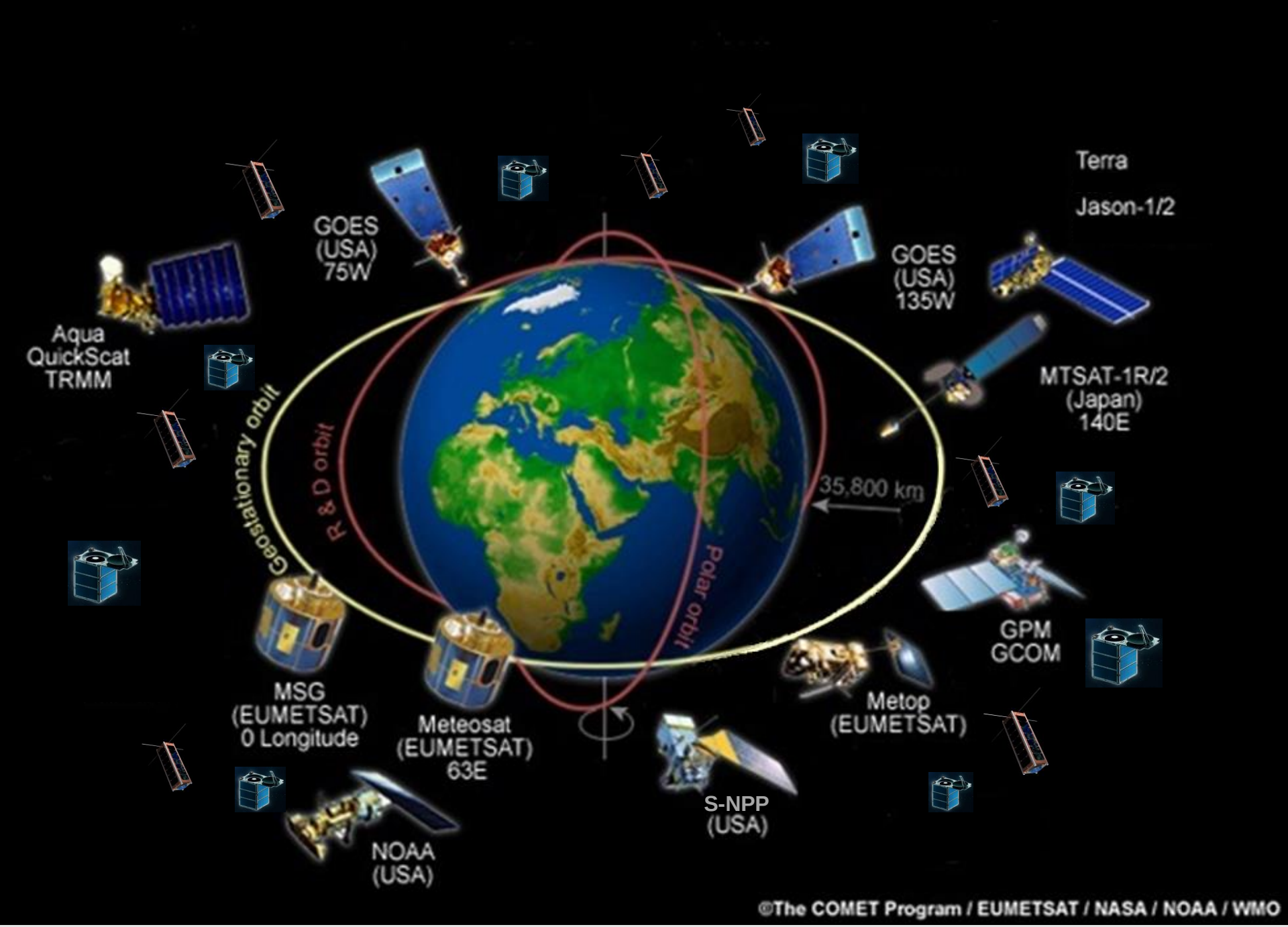
NOAA Commercial Data Policy

Policy to guide the use of space-based commercial data and services to meet NOAA requirements

NESDIS Commercial Solutions Assessment Process

Defines NESDIS process for engaging with the commercial sector to leverage commercial solutions for space-based earth observation requirements

Both are in review in the Administration, expected release 2015.


Terra
Jason-1/2
GOES
(USA)
75W
GOES
(USA)
135W
Aqua
QuickScat
TRMM
MTSAT-1R/2
(Japan)
140E
Geostationary orbit
R & D orbit
Polar orbit
35,800 km
GPM
GCOM
MSG
(EUMETSAT)
0 Longitude
Meteosat
(EUMETSAT)
63E
Metop
(EUMETSAT)
S-NPP
(USA)
NOAA
(USA)
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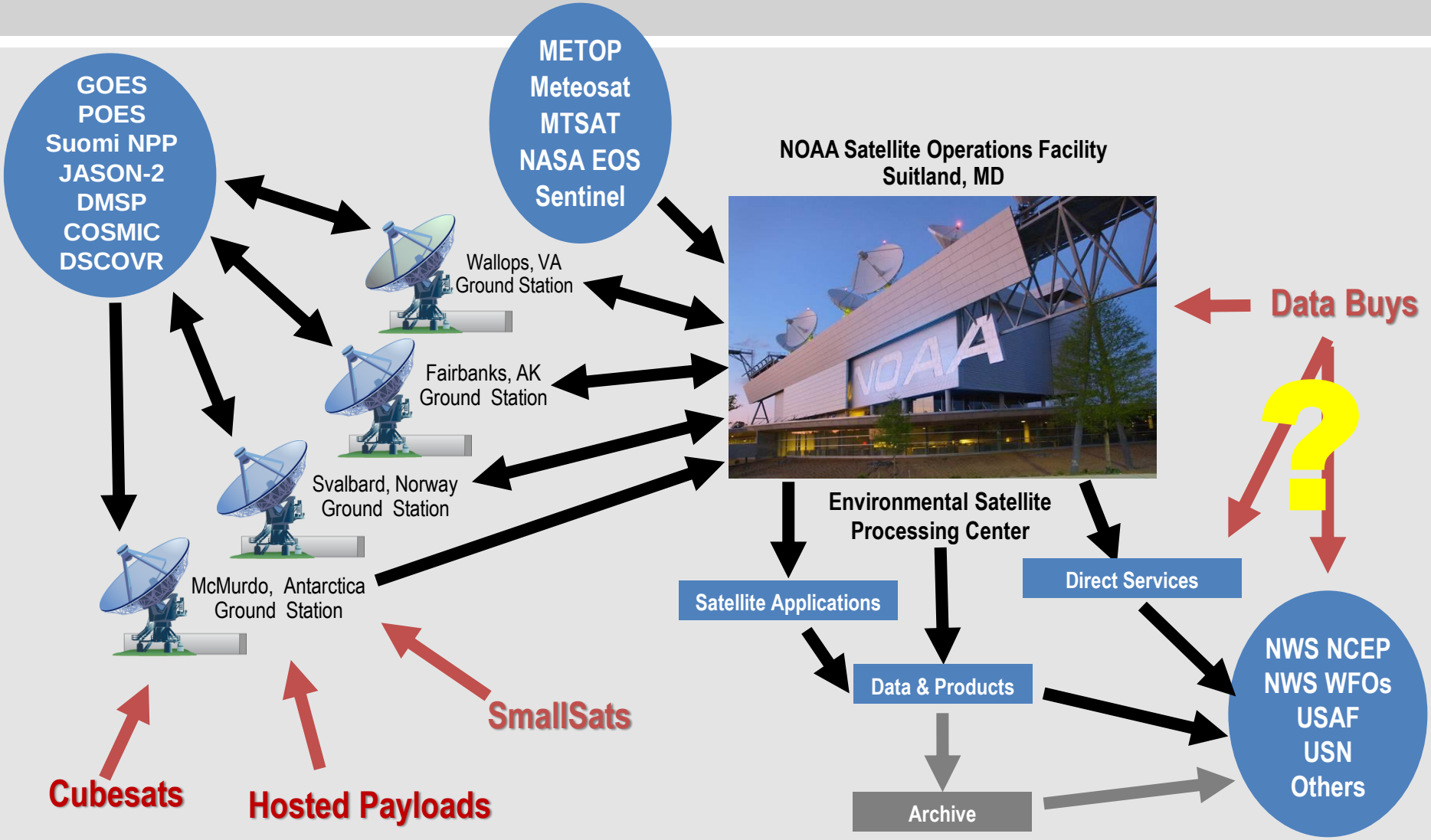
Future Data Sources

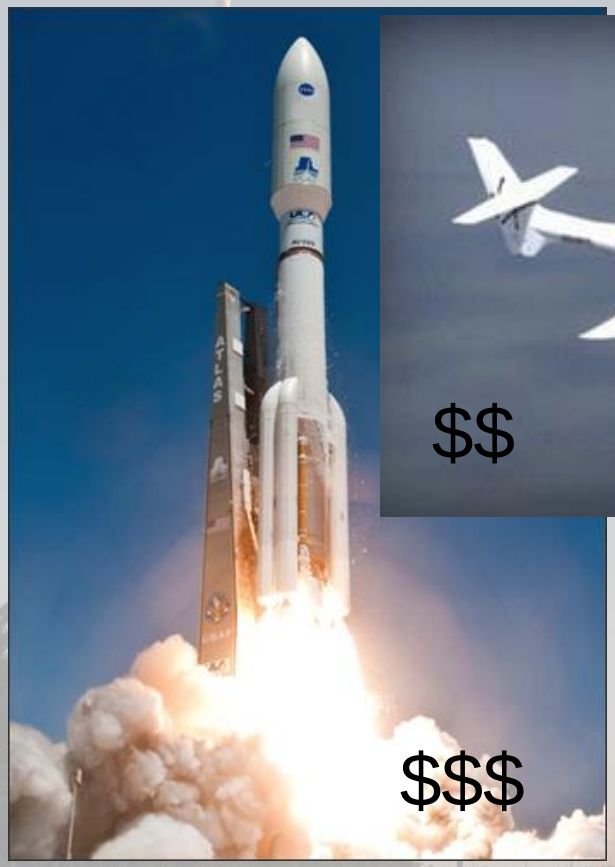


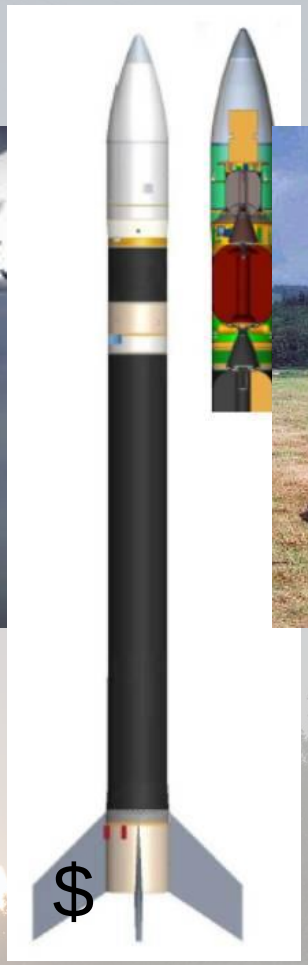
What Community Changes Could Change Our Operating Paradigm?

- Access to space
- Data Quality, Ownership, Integration/Fusion
- Satellite technologies

What Community Changes Could Change Our Operating Paradigm?

- Access to space





What Community Changes Could Change Our Operating Paradigm?

- Access to
- Data Quali
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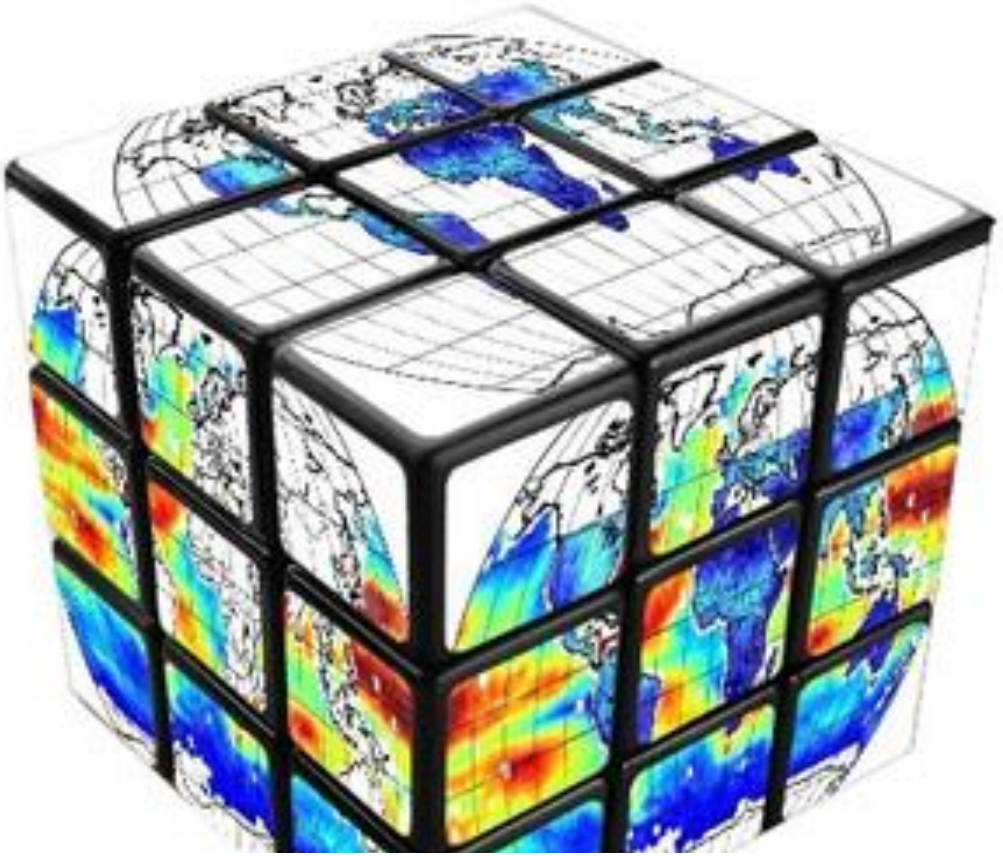
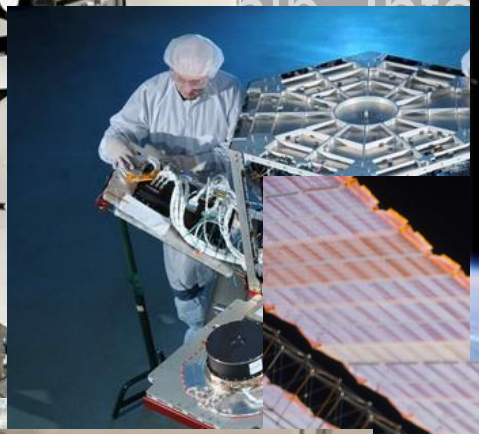
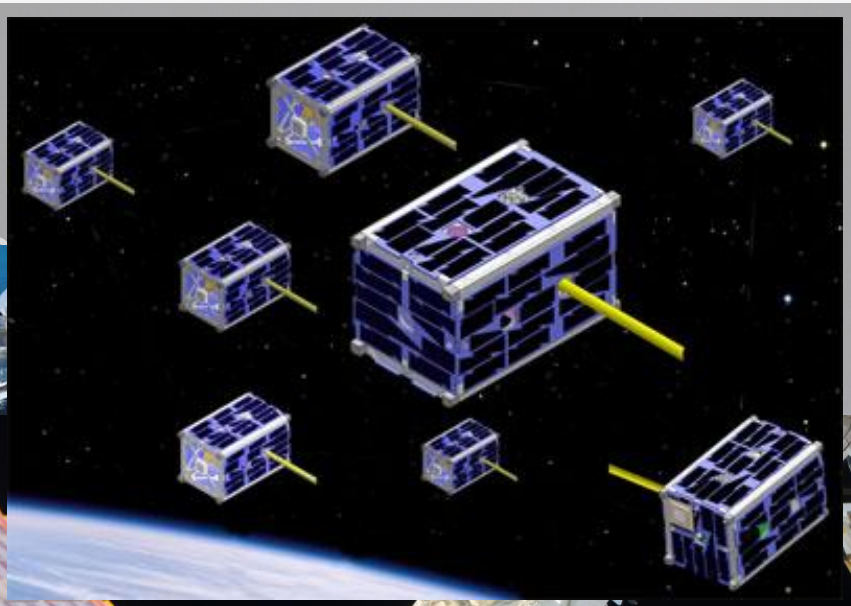
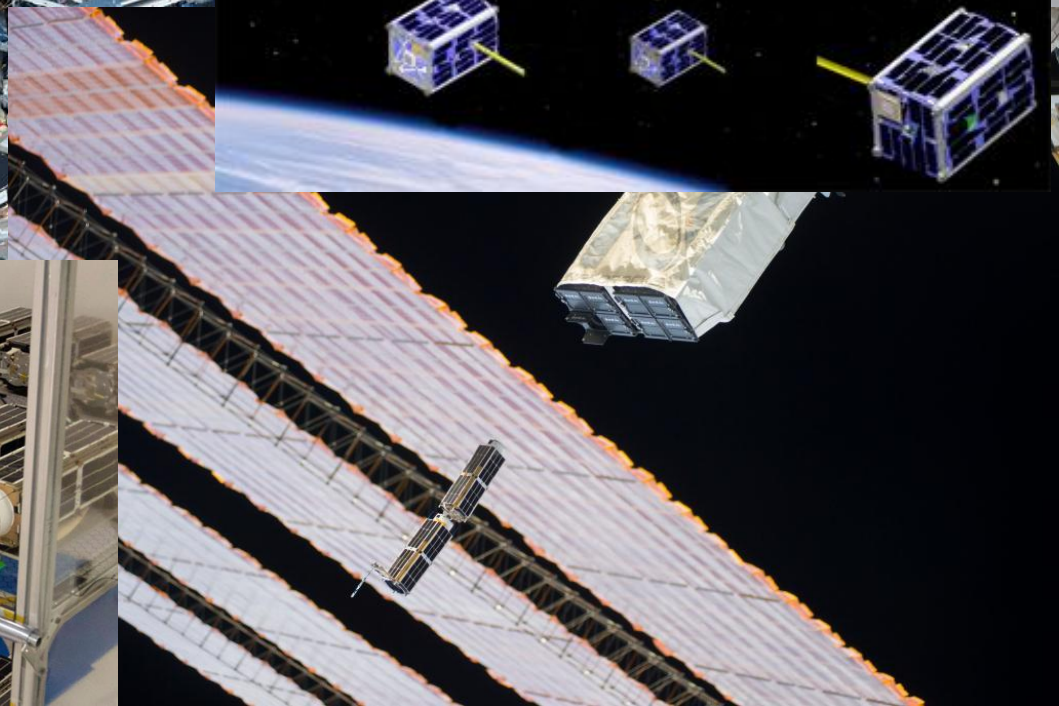


Ultimately most of our products fuse different data sets, so we need to be able to do that fusion efficiently and reflexively

What Community Changes Will Change Our Operating Paradigm?







on the cusp (of something)

Fig. 1. At the point in time that marks the beginning of something.
2. *On the threshold or verge of a development or action.*
3. *At the dividing line or border of two conditions or categories.*

The “something” is often characterized by an explosion, such as of capabilities or opportunities, but an explosion nonetheless.

Our challenge is to benefit from the explosion and not be destroyed by it.